Life circle and bionomics of *Lymantria dispar* L.

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Abstract: The life circle and bionomics of *Lymantria dispar* was studied from the May to the July of 1997 in Tulihe Forestry Enterprise of Inner Mongolia. The results showed that *L. dispar* has one generation in a year, larvae overwinters in eggs, and last 50 days to grow up. From the completing of larvae period to the appearing of adults lasts 11 days. The study made a basis for the period forecasting of *L. dispar* in Inner Mongolia.

Key words: *Lymantria dispar*; Life circle; Bionomics.
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Study methods

In the May of 1997, the overwintered eggs of *Lymantria dispar* were collected in field, immersed in formalin, and dried in cool place. The eggs were divided into 4 groups with 500 eggs in each group, put in glass bottles. The rates of hatching progress were investigated every day (Lan and Wan 1996; Zhang 1988).

After hatching, the first, second and third instar larvae were raised with the needles of larch in glass bottles. The larvae older than the third instar were raised outdoor in gauze cages in which the branches of larch were provided. The larvae developed into next instar stage were put together. Amounts and date of development were recorded. The rate of progress of each instar larvae, pupating and the bionomics of larvae were investigated each day. Temperature and humidity were recorded each day during larvae period.

Pupae were put into glass bottle, one for each, and the number of emergence and date were recorded for investigation of emergence progress and the bionomics.

The just emerged adults were put in big cages, and the number and date of laying egg pieces each day was recorded for investigation of oviposition progress and the bionomics.

The other bionomics of each growing stages of *L. disper* was investigated in field and forest (Yue 1989).

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Life circle

L. dispar has one generation a year in Inner Mongolia and overwintering by egg. The eggs start hatching in early May, 20 d later than in Liaoning Province, and end in early July, 10 d earlier than in Liaoning Province. Pupae can be found in early July, last one month, 10 d later than in Liaoning Province. The adults emerge in early July, lasting one month, 10 d earlier than in Liaoning province, and lay eggs in middle July, 10 d later than in Liaoning province (Xiao 1992) (See table 1).

Bionomics

Adults

The male adults were good at flying and more active than the female. The female adults could produce sex hormones and lure male adults to mate. The mating lasted about 70 min. In general, a female could mate 1 or 2 times, but the male could mate many times. A female could lay 1 or 2 egg pieces and each piece contains 460-1250 eggs. The larvae began to appear in eggs during one month, and to be out next spring.

The progressive rates of emergence of the insect on July 11, 13 and 14 were 13.4%, 20.5% and 13.4% respectively. From July 15, the emergence decreased little by little in number and ended in July 25 (see Fig.1).

L. dispar has 2 peaks on oviposition, 25% and 15.9% respectively on July 14 and 16, and ended oviposition on July 25 (see Fig.2).

Larvae

Egg began to hatch on May 9, ended hatching on May 24 (see Fig.3). The hatching rate showed an

increase trend from the May 12 to 15, reached a peak (40%) on May 15, and decreased from May 16 reached lowest level (2.5%) on May 20.

Until May 25, 5.3% of the 1st-instar larvae develop to the 2nd-instar larvae. From May 26 to 30, it was to peak period for 1st-instar to 2nd-instar. Until June 11, nearly all of the 1st-instar larvae became the 2nd-instar larvae (see Fig.4). The larvae became the 3rd-instar from June 1, with a peak on June 8 and 9. All of the larvae got into the 3rd-instar stage on June 18 (see Fig. 5).

From June 9 to June 24, all of the larvae became 4th-instar, and the peak of progress occurred on June 13, the lowest point of progress was on June 11 and June 22 (see Fig. 6).

All of the 5th-instar larvae appeared from June 18 to July 5. The progressive rate was up to 20% on June 20 (see Fig. 7).

The 6th-instar larvae occurred on June 27, and reached a peak from July 3 to 5 (see Fig. 8).

Table 1. The life circle of *L. dispar* in Inner Mongolia and Shenyang city

Area	Jan.-April			May			June			July			Aug.			Sep.-Dec.		
	F	M	L	F	M	L	F	M	L	F	M	L	F	M	L	F	M	L
Tulihe of inner Mongolia	•	•	•	•	•	•	•											
					—	—	—	—	—	—								
										O	O	O						
										+	+	+						
											•	•	•	•	•	•	•	•
Shenyang City of Liaoning	•	•	•	•	•	•	•											
			—	—	—	—	—	—	—	—	—							
									O	O	O	O						
										+	+	+	+					
										•	•	•	•	•	•	•	•	•

Note: F: The first ten days of the month; M: The middle ten days of the month; L: The last ten days of the month.
• : egg; —: larvae; O: pupae; +: adult.

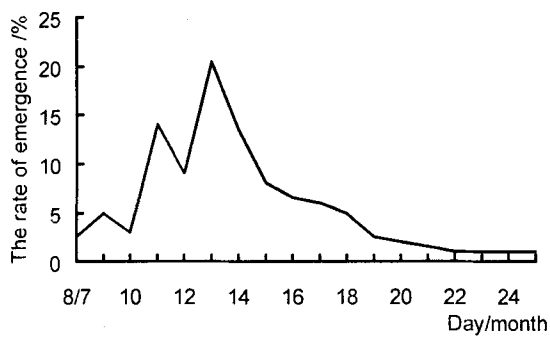

Fig. 1 The progressive rate of emergence of *L.dispar*

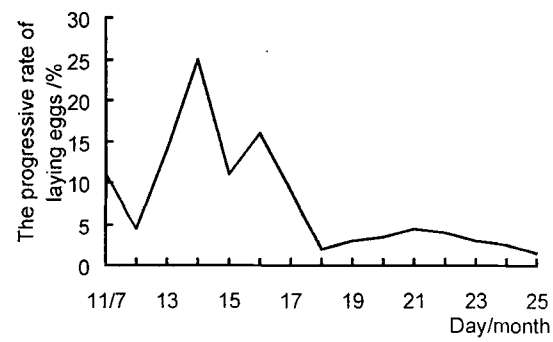

Fig. 2 The progressive rate of laying eggs of *L. dispar*

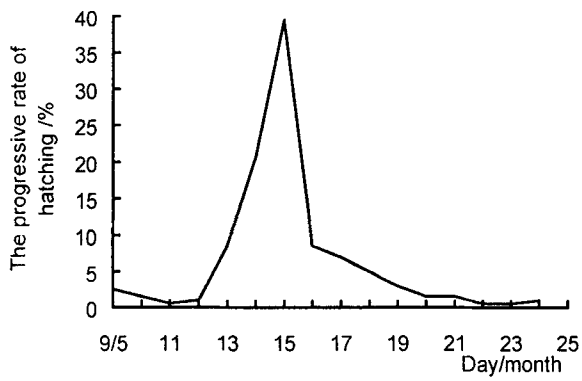

Fig. 3 The progressive rate of hatching of *L. dispar*

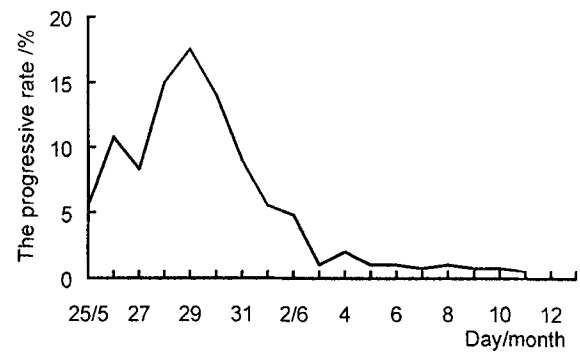

Fig. 4 The progressive rate of the 2nd-instar larvae of *L.dispar*

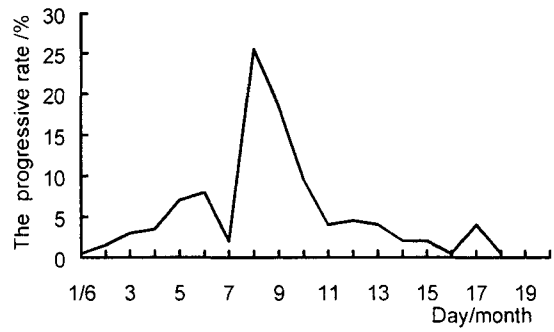

Fig. 5 The progressive rate of the 3rd-instar larvae of *L. dispar*

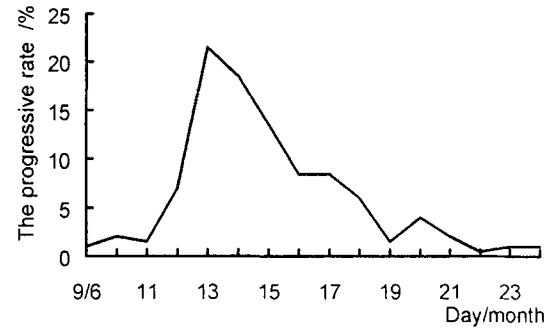

Fig. 6 The progressive rate of the 4th-instar larvae of *L. dispar*

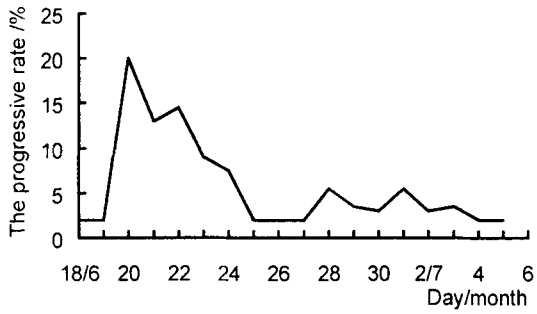

Fig. 7 The progressive rate of the 5th-instar larvae of *L. dispar*

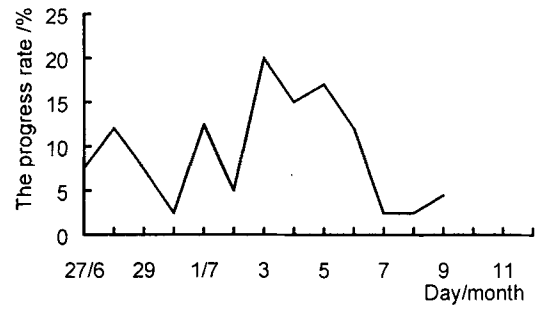

Fig. 8 The progressive rate of the 6th-instar larvae *L. dispar*

Pupae

L. dispar began to pupate from July 1, with a peak on July 10, 11 (see Fig. 9).

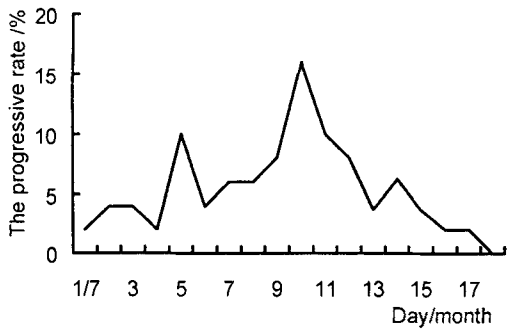

Fig. 9 The progressive rate of pupating of *L. dispar*

Forecasting emergence period of larvae

The beginning peak, peak and ending peak periods of different stages were shown in Table 2 and the accumulated rate of progress of different growing stages of *L.dispar* was shown Fig.10. From Table 2 and Fig.10, we could know that *L. dispar* occurs one generation a year, and the larvae lasted 14, 12, 6, 8 and 10 d respectively from the 1st-instar to the 6th-instar, and 50 d for the whole larvae period. From 6th-instar larvae to pupae, from pupae to adults, and from adult emergence to oviposition, it lasted 7, 4 and 1 d respectively. The occurrence of *L. dispar* larvae could be forecasted based on the developing period.

Table 2. The beginning peak, peak and ending peak periods of different stages

Stage	Beginning period (day/month)	Peak period (day/month)	Ending peak period (day/month)
1st-instar larvae	13/5	14/5	16/5
2nd-instar larvae	26/5	28/5	30/5
3rd-instar larvae	5/6	8/6	11/6
4th-instar larvae	13/6	14/6	17/6
5th-instar larvae	19/6	22/6	30/6
6th-instar larvae	28/6	2/7	4/7
Pupae	4/7	9/7	12/7
Emergence	10/7	12/7	16/7
Laying eggs	11/7	14/7	16/7

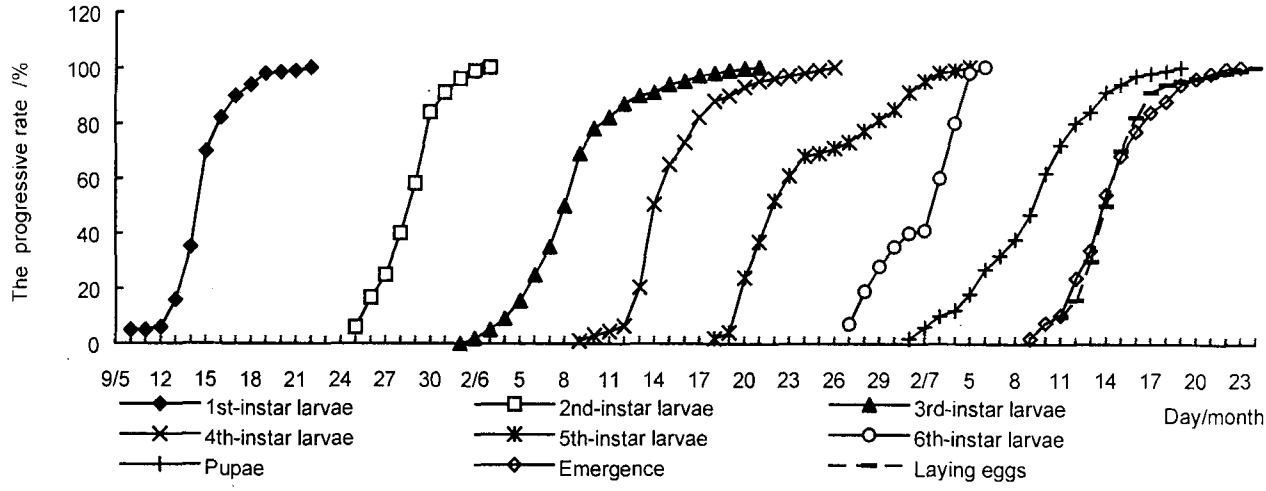

Fig. 10 The accumulated progressive rate of different growing stages of *L.dispar*

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